



**National Biodiesel
Board**
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Mr. John L. Geesman
California Energy Commission
Renewable Energy Program
1516 Ninth St., MS-45
Sacramento, CA 95814-5512

Dear Commissioner Geesman:

On behalf of the U.S. biodiesel industry, we appreciate the opportunity to participate in the administrative proceedings to implement California's Renewable Portfolio Standard (RPS). Ensuring California has a sufficient energy supply to meet its growing demand for electricity is a critical issue facing the future of the state. Biodiesel is an existing, renewable, and seamless energy strategy that can play a large role in assisting California meet its future energy demands and the goals set-out in SB 1078. In that regard, our industry feels strongly that biodiesel qualifies as biomass per the legislation and therefore, respectfully ask the Energy Commission to certify biodiesel as a "renewable energy resource" under the Renewable Portfolio Standard.

To assist you and your colleagues in gaining a better understanding of biodiesel and its applicability under the RPS, we felt it important to start by providing you with a brief primer:

Industry Background

The biodiesel industry in the United States is a relatively new industry. Commercial production has been in existence for a little more than a decade. Yet, biodiesel is not a new concept. Biodiesel has been produced and consumed widely in Europe for several decades. The estimated current European biodiesel market is approximately 200-300 million gallons a year. While the U.S. is not at that level to date, the interest and popularity of the fuel has resulted in dramatic increases in annual production and consumption. For example, domestic consumption of biodiesel in 1999 was 500,000 gallons. In 2002, that amount grew to approximately 20 million gallons. This growth trend is expected to continue well into the future.

The initial investment in research and development of biodiesel in the United States came from state soybean associations who were looking to develop new markets for soybean oil. As markets for the fuel developed, we began to see the introduction of feedstocks derived from other renewable sources including yellow grease (i.e. recycled restaurant oil which is predominantly soybean oil), and rendered animal fats.

California is a strong biodiesel market both in terms of production and consumption. Significant capital investment has been made in production capacity with two production facilities on-line at present and several more planned for construction. California has also seen the development of a broad marketing and distribution network within the existing fuel distribution infrastructure. During 2002, roughly 4 million gallons of biodiesel were produced and/or consumed by Californians in a variety of applications including use as an on-road motor fuel, marine vessels, and electrical generation.

What is Biodiesel?

Biodiesel is the name of a clean burning alternative fuel, produced from domestic, renewable resources such as soybean oil, recycled restaurant grease, and animal fats. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It can be used in compression-ignition (diesel) engines with little or no modifications. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics.

Fuel-grade biodiesel must be produced to strict industry specifications (ASTM D6751) in order to insure proper performance. Biodiesel is the only alternative fuel to have fully completed the health effects testing requirements of the 1990 Clean Air Act Amendments. Biodiesel that meets ASTM D6751 and is legally registered with the Environmental Protection Agency is a legal motor fuel for sale and distribution. Raw vegetable oil cannot meet biodiesel fuel specifications, it is not registered with the EPA, and it is not a legal motor fuel.

Is There an Official Definition of Biodiesel?

For entities seeking to adopt a definition of biodiesel for purposes such as federal or state statute, state or national divisions of weights and measures, or for any other purpose, the official definition consistent with other federal and state laws and Original Equipment Manufacturer (OEM) guidelines is as follows:

Biodiesel is defined as mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats which conform to ASTM D6751 specifications for use in diesel engines. Biodiesel refers to the pure fuel before blending with diesel fuel. Biodiesel blends are denoted as, "BXX" with "XX" representing the percentage of biodiesel contained in the blend (i.e.: B20 is 20% biodiesel, 80% petroleum diesel).

How is Biodiesel Made?

Biodiesel is made through a chemical process called transesterification whereby the glycerin is separated from the fat or vegetable oil. The process leaves behind two products -- methyl esters (the chemical name for biodiesel) and glycerin (a valuable byproduct usually sold to be used in soaps and other products).

What are the Environmental and Health Effects of Biodiesel?

Biodiesel is better for the environment because it is made from renewable resources and has lower emissions compared to petroleum diesel. It is less toxic than table salt and biodegrades as fast as sugar. Since it is made domestically from renewable resources, its use decreases our dependence on foreign oil and contributes to our own economy.

Scientific research also confirms that biodiesel exhaust has a less harmful impact on human health than petroleum diesel fuel. Biodiesel emissions have decreased levels of polycyclic aromatic hydrocarbons (PAH) and nitrated PAH compounds that have been identified as potential cancer causing compounds. Test results indicate PAH compounds were reduced by 75 to 85 percent, with the exception of benzo(a)anthracene, which was reduced by roughly 50 percent. Targeted nPAH compounds were also reduced dramatically with biodiesel fuel, with 2-nitrofluorene and 1-nitropyrene reduced by 90 percent, and the rest of the nPAH compounds reduced to only trace levels.

Can Biodiesel Mitigate Global Warming?

A 1998 biodiesel lifecycle study, jointly sponsored by the US Department of Energy and the US Department of Agriculture, concluded biodiesel reduces net CO² emissions by 78 percent compared to petroleum diesel. This is due to biodiesel's closed carbon cycle. The CO² released into the atmosphere when biodiesel is burned is recycled by growing plants, which are later processed into fuel.

How do biodiesel emissions compare to petroleum diesel?

Biodiesel is the only alternative fuel to have fully completed the health effects testing requirements of the Clean Air Act. The use of biodiesel in a conventional diesel engine results in substantial reduction of unburned hydrocarbons, carbon monoxide, and particulate matter compared to emissions from diesel fuel. In addition, the exhaust emissions of sulfur oxides and sulfates (major components of acid rain) from biodiesel are essentially eliminated compared to diesel. Of the major exhaust pollutants, both unburned hydrocarbons and nitrogen oxides are ozone or smog forming precursors. The use of biodiesel results in a substantial reduction of unburned hydrocarbons. Emissions of nitrogen oxides are either slightly reduced or slightly increased depending on the duty cycle of the engine and testing methods used. Based on engine testing, using the most stringent emissions testing protocols required by EPA for certification of fuels or fuel additives in the US, the overall ozone forming potential of the speciated hydrocarbon emissions from biodiesel was nearly 50 percent less than that measured for diesel fuel.

Below is an emissions chart derived from the results of a 2002 U.S.EPA report which compared the emissions data of 39 separate published studies. The result is an average of the emissions for biodiesel (B100) and a 20% blend (B20). The engines on which the data was collected were medium and heavy-duty applications. While most large gen sets employ heavy duty engines similar to those used for on-road purposes, the figures below may not accurately reflect the exact emission profiles of large gen sets. However, the numbers below do provide a general picture of the levels of emission reductions which can be achieved through the use of biodiesel.

AVERAGE BIODIESEL EMISSIONS COMPARED TO CONVENTIONAL DIESEL

<u>Emission Type</u>	<u>B100</u>	<u>B20</u>
Regulated		
Total Unburned Hydrocarbons	-67%	-20%
Carbon Monoxide	-48%	-12%
Particulate Matter	-47%	-12%
NOx	+10%	+2%

Non-Regulated

Sulfates	-100%	-20%*
PAH	-80%	-13%
(Polycyclic Aromatic Hydrocarbons)**		
nPAH (nitrated PAH's)**	-90%	-50%***
<u>Ozone potential of speciated HC</u>	<u>-50%</u>	<u>-10%</u>

* Estimated from B100 result

** Average reduction across all compounds measured

*** 2-nitrofluorine results were within test method variability

Does Biodiesel Cost More Than Conventional Diesel?

Biodiesel does cost more per gallon than conventional diesel fuel. While the price of both fuels can fluctuate and impact the incremental difference, biodiesel has generally sold for approximately \$1.00/gallon more than conventional diesel. The incremental costs associated with biodiesel blends are lower than that of neat biodiesel. For example, with a 20% biodiesel blend we have historically seen an incremental cost difference with conventional diesel in the \$.10-\$.20 cents/gallon range. We can work with our member producer/marketers to provide you with additional data in this area.

Can I Use Biodiesel in My Existing Engine and Do I Need Special Storage Facilities?

Biodiesel can be operated in any diesel engine with little or no modification to the engine or the fuel system. Biodiesel has a solvent effect that may release deposits accumulated on tank walls and pipes from previous diesel fuel storage. The release of deposits may clog filters initially and precautions should be taken. Ensure that only fuel meeting the biodiesel specification is used.

In general, the standard storage and handling procedures used for petroleum diesel can be used for biodiesel. The fuel should be stored in a clean, dry, dark environment. Acceptable storage tank materials include aluminum, steel, fluorinated polyethylene, fluorinated polypropylene and teflon. Copper, brass, lead, tin, and zinc should be avoided.

Regarding the March 25 workshop discussion items pertaining to biomass and “does biodiesel qualify as biomass”, the industry has reviewed SB 1078 assessing its purpose and the definitional standard for biomass. **We strongly believe biodiesel meets all of the requirements necessary to qualify as biomass and be certified as a renewable energy resource.**

The legislation in defining biomass did not provide clear guidance as to what is to be specifically included or excluded under the definition. However, in looking at the definition it is apparent the underlying premise is that qualifying matter must be organic and derived from agricultural means. SB 1078 references the definition for biomass which is included in the Policy Report for AB 1890 relating to Renewables Funding. That definition is broad, however it does specifically reference...”agricultural waste and other organic material that may be burned to produce electricity.” Biodiesel by definition is an organic substance and all of the feedstocks used to produce biodiesel meet the qualifying standard for biomass.

All feedstocks, presently used and those under research, breakdown along two major groups and are all agriculturally derived and organic in nature:

- **Virgin Oils:** Virgin oils are oils derived from oilseeds including soybeans, rapeseed, mustard seed, and cottonseed. These crops are grown commercially as agricultural products. These crops are consistently produced annually and are therefore renewable in nature.
 - **Yellow-Grease and Animal-Fats:** Yellow-grease and animal-fats are also organic and derived from agricultural means.
1. Yellow-Grease--Yellow-Grease is recycled restaurant cooking oil which has been rendered into a tradable commodity by removing water and solid matter. Restaurant cooking oil is hydrogenated soybean oil. Therefore, this feedstock is derived from an agricultural crop which is organic and renewable in nature. Additionally, as America’s demand for fast-food continues to increase, so will the production of cooking oil derived from soybean oil. The growing biodiesel market is providing an additional value-added market for yellow-grease. This market is important as it helps eliminate yellow-grease from the waste stream which reduces stress on waste water treatment facilities, as well as issues around it being put into landfills.
 2. Animal-Fats--Feedstocks derived from animal-fats can also meet the definitional standard for qualification as biomass. Animal-Fats used for biodiesel production are derived from rendering animal carcasses from large production farms, dairies, feedlots, and meat-packing plants. The oil produced from the rendered carcasses is then used as a feedstock for producing biodiesel. Just as oilseed row crops are renewable in that they are capable of being replaced by a natural ecological cycle, so too are livestock. However, a major difference arises in the intended purpose for raising the two products. These differences must be accounted for in describing how the various feedstocks meet the definitional standard for qualifying as biomass. While oilseeds are produced for their oil content, the oil produced from animal rendering is derived from the waste by-products of meat and dairy production.

We hope this provides the Commission with a good starting background and perspective from the industry to assist you in your deliberations involving biodiesel as a potential certified renewable energy resource.

If we can ever be of further assistance to you as a resource, please do not hesitate to contact us. The National Biodiesel Board is the national trade association representing the biodiesel industry as the coordinating body for research and development in the United States. It was founded in 1992 by state soybean commodity groups, who were funding biodiesel research and development programs. Since that time, the NBB has developed into a comprehensive industry association, which coordinates and interacts with a broad range of cooperators including industry, government, and academia. NBB's membership is comprised of state, national, and international feedstock and feedstock processor organizations, biodiesel suppliers, fuel marketers and distributors, and technology providers. For additional information, please visit the NBB website. That site is: www.biodiesel.org.

Again, thank you for your time and consideration. Please call if you have questions or need additional information. I can be reached at 925/648-3403.

Sincerely,
Scott Hughes
State Regulatory Affairs Manager
National Biodiesel Board